AQA GCSE Physics

Practice answers

	Answers	Extra information	Mark	AO / Specification reference
01.1	from AB to CD/ABCD		1	AO2 4.7.2.2 4.7.2.3
01.2	the forces are the same size but in opposite directions/side AB goes up, side CD goes down so the coil spins clockwise		1 1 1	AO2 4.7.2.3
01.3	the current in BC is parallel to the magnetic field Fleming's Left Hand rule says that the current must be perpendicular to the field for a force to act		1 1	AO2 4.7.2.2 4.7.2.3
01.4	the coil has momentum so continues to move until the coil is in contact with the battery again on the other side		1 1	AO2 4.7.2.3 4.5.7.1
02.1	the Earth's magnetic field systematic error		1 1	AO2 4.7.1.2
02.2	subtract the measurements in 2.1 from each of the readings		1	AO3 4.7.1.2
02.3	the sensor cannot be zero cm from the wire as that would be the centre of the wire/inside the wire		1	AO2 4.7.2.1

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02.4	If quantities are inversely proportional, then doubling one quantity will halve the other when the distance doubles from 1cm to 2cm the magnetic field goes from 0.203 mT for 0.102 mT $\frac{0.102}{0.203} = 0.5$		1 1 1	AO1 AO2 4.7.2.1
03.1	a permanent magnet is always magnetic an induced magnet becomes magnetic when it is put in a magnetic field but then loses its magnetism when it is removed from the field		1 1	AO1 4.7.1.1
03.2	yes (it has become an induced magnet) any magnet has a magnetic field around it		1 1	AO1 AO2 4.7.1.1
03.3	left box (closest to screwdriver) 'S', right box 'N'		1	AO2 4.7.1.1
03.4	no it is no longer magnetic when it is removed from the magnetic field		1 1	AO2 4.7.1.1
04.1	independent: material of the core dependent: mass of iron filings		1 1	AO2 4.7.2.1
04.2	number of turns of the solenoid/coil current in the wire		1 1	AO2 4.7.2.1
04.3	nickel allow second measurement/1.0 g for nickel alloy they did not include it		1 1	AO3 4.7.2.1

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04.4	small if there was lots of nickel in the alloy, the mass of iron filings that it picks up would be large		1 1	AO3 4.7.1.2
04.5	the core and armature should be made of iron		1	AO2
04.6	when the switch is closed the coil of wire becomes an electromagnet one end of the iron armature is attracted to the coil, causing it to rock on its pivot so that the other end of the armature closes the contacts of the second switch in the high voltage circuit		1 1 1	AO3 4.7.2.1
05.1	the wire will get hot when it is connected to the battery only connect the wire for short periods of time		1 1	AO2 AO3 4.7.2.1
05.2	magnetic field with the same shape as that of a bar magnet		1	AO1 4.7.2.1
05.3	solenoid B it has more turns/coils		1 1	AO2/1 4.7.2.1
05.4	the compass needle does not move as all the field lines are pointing in the same direction and the compass follows the direction of the field lines		1 1	AO2 4.7.2.1
06.1	use a magnet/put a magnet near the coil causing a force on the wire/a motor is a coil of current-carrying wire in a magnetic field		1 1	AO2 4.7.2.3
06	**Level 3**: Correct identification of similarities and differences. Correct application of ideas about direct current/alternating current. Answer shows clear organisation.		5-6	AO1 AO2

	Answers	Extra information	Mark	AO / Specification reference
	Level 2: Some details of action of motor/loudspeaker missing. Answer shows some organisation.		3-4	AO3 4.7.2.3 4.7.2.4
	Level 1: One or two similarities/difference given. No application of direct current to loudspeaker. Answer shows poor organisation.		1-2	
	No relevant content.		0	
	Indicative content: • both the motor and loudspeaker contain a coil of wire and a magnet • a simple d.c. motor contains a battery/source of direct current, but a loudspeaker uses a source of alternating current • both use the motor effect, but the force is in the same direction in the motor, but changes direction in the loudspeaker. • the loudspeaker coil would move out and stay there • no sound would be produced.			
07.1	a region where a magnetic material experiences a force/a region around a magnet where magnetic forces act.		1	AO1 4.7.1.2
07.2	one mark for arrows on lines pointing away from poles one mark for shape of field		2	AO1 4.7.1.2
07.3	the magnetic field lines are close together	do not accept 'there are more magnetic field lines'	1	AO1 4.7.1.2

	Answers	Extra information	Mark	AO / Specification reference
07.4	halfway between A and B the force exerted by each magnet is the same closer to A the force on the object depends on the distance from the poles the force by A is smaller, so the object needs to be closer		1 1 1 1 1	AO3 4.7.1.2
08.1	speed = $\frac{\text{distance}}{\text{time}}$ $3\times10^{8} = \frac{\text{distance}}{0.2}$ distance travelled by radio waves = $3\times10^{8} \times 0.2$ $= 6\times10^{7}$ m distance to asteroid = $\frac{6\times10^{7}}{0.2}$ = 3×10^{7} m		1 1 1+1	AO2 4.5.6.1.2
08.2	the range of values within which the true values lies	or words to that effect	1	AO1
08.3	measure the distance to the object after a certain time interval find the difference in distance divide by the time between the pulses		1 1 1	AO3 4.5.6.1.2
09.1	the motor effect/there is a force on a current carrying conductor in a magnetic field		1	AO2 4.7.2.2
09.2	the field around a magnet gets weaker as you move away the field is not strong enough to produce a force		1 1	AO2 4.7.1.2

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09.3	place the magnetic field sensor a distance from the foil and measure the distance and magnetic field strength move the sensor, measure distance and magnetic field strength again make repeat measurements of the field at all the distances		1 1 1	AO1 4.7.2.1
09.4	a graph showing a negative relationship the graph shows that as distance increases magnetic field strength decreases	accept straight or curved line with negative gradient.	1 1	AO2 4.7.2.2
10.1	(towards) north/the north magnetic pole of the Earth there is a magnetic field around the Earth	further possible explanation: there is a gigantic south pole at magnetic north so the compass arrow head which is a N pole is attracted to the gigantic S pole at magnetic north	1 1	AO1 AO2 4.7.1.2
10.2	the magnetic field around the wire is stronger than the magnetic field of the Earth the needle of the compass changed direction when the current was switched on		1 1	AO1 AO2 4.7.1.2
10.3	a compass needle is a magnet		1	AO1 4.7.1.2
11.1	geographic north is the point about which the Earth spins magnetic north is the point to which a compass points		1 1	AO1 4.7.1.2
11.2	he used a compass to look at the direction in which the compass points as he moved it around the model Earth		1 1	AO3 4.7.1.2

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11.3	new evidence/data show that old models are incorrect and need to change		1 1	AO2 4.7.1.2
11.4	so that other scientists can see/check/use their work/peer review		1	AO1 4.7.1.2
12.1	one mark for half pints plotted correctly one mark for all points plotted correctly one mark for line of best fit		3	AO2 AO3 4.7.2.3
12.2	as the current increases the speed increases at an increasing rate/rate is not constant/speed is not proportional to current		1 1	AO3 4.7.2.3
12.3	force = magnetic field strength × current × length force = mass × acceleration as the current increases the force increases as the force increases the acceleration increases acceleration is the rate of change of speed/velocity so the rate of change of speed/velocity increases	accept F = BIL accept F = ma	1 1 1 1 1	AO1 AO3 4.5.6.2.2 4.7.2.2 4.7.2.3
13.1	to the right		1	AO2/1 4.7.2.2

	Answers	Extra information	Mark	AO / Specification reference
13.2	force = magnetic field strength × current × length 2×10^{-3} = magnetic field strength × 1.2 × 0.10 magnetic field strength B = $\frac{2\times10^{-3}}{1.2\times0.10}$ = 0.017 T/tesla	accept F = BIL	1 1 1 1	AO1 AO2 4.7.2.2
13.3	the magnetic field of the horseshoe magnet is uniform (straight lines between the poles) and going up/from N to S the magnetic field of the rod is circular/concentric circles when the fields are superimposed on top of each other, on one side of the rod all the field lines are in the same direction creating a strong field on the other side some field lines cancel as in opposite directions so there is a weak field the force makes the rod move from strong to weak field		1 1 1 1 1	AO1 AO3 4.7.1.2 4.7.2.1 4.7.2.2
14.1	ultraviolet light has a range of wavelengths/there is a band of frequencies that we call ultraviolet light		1	AO1 4.6.2.1
14.2	red light has a lower frequency red light has a longer wavelength	accept converse	1 1	AO1 AO2 4.6.2.1
14.3	increases the risk of (skin) cancer **or** causes premature aging	accept DNA damage/mutation	1	AO1 4.6.2.3

	Answers	Extra information	Mark	AO / Specification reference
14.4	correct use: • tanning • checking for forgeries • killing insects • marking property which can be traced after burglary	accept correct alternative suggestions	1	AO1 4.6.2.4